

EnecoTech Inc.
1580 Lincoln Street • Suite 1000
Denver, Colorado 80203
(303) 861-2200 • Fax (303) 861-2201



April 30, 2003

Mr. Jeffrey Robichaud
U.S. Environmental Protection Agency
901 North 5th Street
Kansas City, Kansas 66101

REC'D
MAY 1 2003
RCAP

99-0138R-018

Ms. Katherine Dunn
Bureau of Waste Management
Kansas Department of Health and Environment
1000 SW Jackson, Suite 320
Topeka, Kansas 66612

**Re: Semiannual ICM Report, 4th Quarter 2002 and 1st Quarter 2003
Quarterly Corrective Action Progress Report
TPI Petroleum, Inc. Arkansas City Refinery
Facility ID: KSD087418695**

424199



RCRA RECORDS

Dear Mr. Robichaud and Ms. Dunn:

This report is presented on behalf of TPI Petroleum, Inc. to fulfill the quarterly reporting requirements in Part II, Section III.L of the Hazardous Waste Management Permit, and the reporting outlined in the Interim Corrective Measures Addendum, TPI Petroleum Inc. Arkansas City Refinery, Arkansas City, Kansas, dated March 3, 1995.

1. CORRECTIVE ACTION PROGRESS

- Description of Work Completed: The draft Corrective Action Goals were developed and submitted to TPI for review.
- Summaries of all Findings and Summaries of Laboratory Data: No laboratory data were collected during the reporting period.
- Summaries of all Problems or Potential Problems Encountered During this Reporting Period and Actions Taken to Rectify Problems: No problems were encountered during the reporting period.
- Projected Work for the Next Quarter: During the 2nd quarter of 2003 a meeting will be held with TPI Petroleum, Inc. management staff to review the draft corrective action goals. A subsequent meeting will be arranged with EPA and KDHE to discuss current activities at the refinery and review the corrective action goals.
- Instances of Noncompliance with Part II of the Permit not Otherwise Required to be Reported Pursuant to Permit Condition II.R: There are no instances of noncompliance to report under Part II.R of the permit.



Recycled Paper

2. INTERIM CORRECTIVE MEASURES

This report presents the groundwater elevation, phase-separated hydrocarbon measurements, and data from the visual inspection of the south bank of the Walnut River, collected during the 4th quarter of 2002 and the 1st quarter of 2003. The zones (1-5) referenced on the visual inspection logs correspond to the ICM zones (*ICM Design Plan*, EnecoTech 1994).

The RCRA Waste Management Area (WMA) groundwater capture and recovery system maintained the gradient reversal required in Part I of the hazardous waste management permit throughout this reporting period. The WMA groundwater capture zone monitoring results are included in the facility's semiannual and annual groundwater monitoring reports.

This report contains a tabulation of the groundwater level and phase-separated hydrocarbon monitoring data collected October 2002 through March 2003 on Tables 1, 2, 3, 4, 5, and 6 respectively. The data are presented as groundwater potentiometric surface elevation contour maps on Figures 1, 2, 3, 4, 5, and 6 for the six months in the reporting period. These maps also show the extent of measurable phase-separated hydrocarbons for each respective month.

The ICM system groundwater pumping and hydrocarbon product recovery rates for the reporting period are summarized on Table 7. Tables 8, 9, 10, 11, 12 and 13 summarize the Walnut River visual inspections performed during the reporting period.

3. SOIL VAPOR EXTRACTION SYSTEM

The SVE system at the closed surface impoundments was shut down during October, November, and intermittently in December and January for the resolution of maintenance issues with the catalytic oxidizer used to control air emissions, as well as replacement of the SVE system blower. The system was placed online at the end of January 2003 and operated through the end of the reporting period.

4. AIR SPARGE SYSTEM

The air sparge system at the closed surface impoundments was offline during October, November, and intermittently in December and January due replacement of the air sparge blower, reconfiguration of system piping, and further necessary maintenance of other air sparge system components. The air sparge system was placed into normal operation in mid-December 2002, and operated fairly consistently through the end of the reporting period.

5. RECOVERY WELL EXPANSION

The recovery well network is being expanded into an area northwest of the Waste Management Area. Attached Figure 7 shows the locations of new wells RW-11, RW-21, RW-31, and RW-33, all located outside the Waste Management Area. The expansion is being undertaken in order to enhance free product recovery and the overall groundwater remediation in that area. The recovered groundwater will be treated in the facility

Mr. Jeffrey Robichaud
Ms. Katherine Dunn
April 30, 2003
Page 3

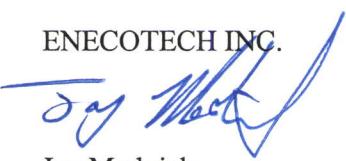
TPI Petroleum, Inc.
4th Quarter 2002 and 1st Quarter 2003 ICM Report
Quarterly Corrective Action Progress Report

wastewater treatment system and discharged with the other treated groundwater from the site. Construction of the new recovery wells began on April 21. The system should be operational in June 2003.

If you have any questions or comments regarding this information, please call Brenda Manterola of Valero at (210) 592-4619 or Jay Mednick at (303) 861-2200 ext. 129.

Sincerely,

ENECOTECH INC.


Jay Mednick

Attachments: Tables 1-13, Figures 1-7

cc: Brenda Manterola, Valero w/enc.
Harold Green, Valero w/enc.
Rob Franke, RBA w/enc.

Table 1 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
October 2002

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)¹</i>
3	10/15/02	22.38	22.98	0.60	1041.12	1041.61
4	10/15/02	18.55	23.33	4.78	1039.13	1043.10
7	10/15/02	ND	18.21	0.00	1052.69	1052.69*
10	10/15/02	22.37	22.37	Trace	1047.15	1047.15
11	10/15/02	19.23	19.43	0.20	1042.54	1042.71
16	10/15/02	20.58	20.58	0.00	1043.92	1043.92
17	10/15/02	ND	18.71	0.00	1045.94	1045.94
18	10/15/02	ND	23.55	0.00	1045.37	1045.37
21	10/15/02	ND	20.46	0.00	1043.34	1043.34
24	10/15/02	ND	15.52	0.00	1053.19	1053.19
34	10/15/02	16.65	17.58	0.93	1043.11	1043.92
36	10/15/02	ND	18.33	0.00	1049.21	1049.21
40	10/15/02	18.29	19.16	0.87	1041.26	1041.97
44	10/15/02	19.06	19.06	Trace	1045.11	1045.11
45	10/15/02	22.32	22.32	Trace	1043.40	1043.40
47	10/15/02	21.32	21.35	0.03	1043.16	1043.18
55	10/15/02	ND	19.78	0.00	1045.80	1045.80
56	10/15/02	18.47	18.47	Trace	1044.16	1044.16
58	10/15/02	17.88	18.70	0.82	1040.86	1041.54
59	10/15/02	18.81	20.86	2.05	1038.12	1039.80
61	10/15/02	21.88	23.68	1.80	1039.40	1040.88
62	10/15/02	22.26	22.71	0.45	1041.65	1042.03
63	10/15/02	17.91	17.91	0.00	1043.95	1043.95
72	10/15/02	ND	16.05	0.00	1050.14	1050.14
75	10/15/02	14.11	14.11	Trace	1049.66	1049.66
88	10/15/02	19.68	19.69	0.01	1043.21	1043.22
91	10/15/02	ND	18.31	0.00	1043.02	1043.02
95	10/15/02	ND	16.56	0.00	1047.69	1047.69
96	10/15/02	22.40	22.41	0.01	1044.06	1044.07
98	10/15/02	ND	20.61	0.00	1048.55	1048.55
99	10/15/02	19.78	20.34	0.56	1048.93	1049.40
101	10/15/02	22.14	22.35	0.21	1044.13	1044.30
102	10/15/02	20.78	22.31	1.53	1043.17	1044.39
103	10/15/02	21.28	22.15	0.87	1043.91	1044.61
104	10/15/02	17.83	18.91	1.08	1042.70	1043.56
106	10/15/02	ND	26.36	0.00	1047.71	1047.71
108	10/15/02	ND	25.49	0.00	1047.08	1047.08
110	10/15/02	ND	18.51	0.00	1044.31	1044.31

Table 1 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
October 2002

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
113	10/15/02	ND	33.37	0.00	1038.88	1038.88
114	10/15/02	ND	30.64	0.00	1040.12	1040.12
115	10/15/02	ND	21.02	0.00	1049.59	1049.59
116	10/15/02	ND	22.24	0.00	1049.53	1049.53
117	10/15/02	20.41	20.42	0.01	1049.41	1049.42
118	10/15/02	ND	31.11	0.00	1039.58	1039.58
CMW-1	10/15/02	ND	19.98	0.00	1039.73	1039.73
CMW-2	10/15/02	ND	22.40	0.00	1039.34	1039.34
CMW-3	10/15/02	ND	20.29	0.00	1039.84	1039.84
CMW-4	10/15/02	ND	17.30	0.00	1040.97	1040.97
E-1	10/15/02	20.64	20.81	0.17	1040.97	1041.11
E-3	10/15/02	ND	20.38	0.00	1042.82	1042.82
ET-01	10/15/02	12.33	12.34	0.01	1044.06	1044.07
ET-03	10/15/02	ND	24.95	0.00	1045.20	1045.20
MW-1001	10/15/02	19.12	20.49	1.37	1041.89	1042.99
MW-1002	10/15/02	ND	31.40	0.00	1040.72	1040.72
MW-1003	10/15/02	31.37	31.55	0.18	1042.02	1042.16
MW-12	10/15/02	32.28	32.28	Trace	1039.69	1039.69
MW-13	10/15/02	ND	18.93	0.00	1044.07	1044.07
MW-17	10/15/02	18.02	18.02	Trace	1047.69	1047.69
MW-6	10/15/02	18.32	18.32	Trace	1044.07	1044.07
NAI-05	10/15/02	ND	22.17	0.00	1046.63	1046.63
NAI-11	10/15/02	5.31	5.31	Trace	1063.58	1063.58
NAI-13	10/15/02	ND	23.38	0.00	1045.08	1045.08
NAI-14	10/15/02	ND	18.32	0.00	1048.75	1048.75
NAI-18	10/15/02	ND	23.09	0.00	1044.37	1044.37
NAI-23	10/15/02	22.85	23.62	0.77	1047.10	1047.72*
NAI-24	10/15/02	ND	22.10	0.00	1047.33	1047.33*
NAI-25	10/15/02	26.21	26.21	Trace	1044.01	1044.01
RCRA-4	10/15/02	ND	16.90	0.00	1044.53	1044.53
RCRA-7	10/15/02	ND	24.51	0.00	1039.22	1039.22
RCRA-8(R)	10/15/02	ND	20.52	0.00	1043.85	1043.85
RCRA-MW-4	10/15/02	ND	28.33	0.00	1041.76	1041.76
RFI2-10C	10/15/02	ND	17.22	0.00	1048.08	1048.08
RFI2-11C	10/15/02	ND	16.58	0.00	1050.93	1050.93
RFI2-14C	10/15/02	ND	22.08	0.00	1049.61	1049.61
RFI2-15D	10/15/02	ND	19.76	0.00	1048.09	1048.09
RFI2-16D	10/15/02	ND	22.36	0.00	1047.27	1047.27*

Table 1 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
October 2002

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
RFI2-17D	10/15/02	24.78	24.81	0.03	1044.36	1044.38
RFI2-1A	10/15/02	27.68	27.68	Trace	1044.83	1044.83
RFI2-1D	10/15/02	23.98	24.72	0.74	1046.98	1047.57
RFI2-2A	10/15/02	27.36	27.36	Trace	1044.25	1044.25
RFI2-2D	10/15/02	27.03	27.17	0.14	1044.80	1044.91
RFI2-3D	10/15/02	ND	27.31	0.00	1043.13	1043.13
RFI2-4C	10/15/02	ND	27.41	0.00	1042.56	1042.56
RFI2-7C	10/15/02	ND	17.74	0.00	1043.59	1043.59
RFI2-8C	10/15/02	ND	13.27	0.00	1044.40	1044.40
RW-10	10/15/02	16.34	21.22	4.88	1039.12	1043.02
RW-20	10/15/02	22.14	22.16	0.02	1043.20	1043.22
RW-30	10/15/02	20.01	20.95	0.94	1040.90	1041.69
RW-35	10/15/02	27.82	27.83	0.01	1035.28	1035.29
RW-40	10/15/02	27.84	39.62	***	***	***
RW-45	10/15/02	36.49	36.78	0.29	1035.73	1035.96
RW-50	10/15/02	40.12	42.18	2.06	1030.22	1031.87
RW-55	10/15/02	ND	34.95	0.00	1037.83	1037.83
RW-60	10/15/02	ND	40.60	0.00	1031.77	1031.77
RW-65	10/15/02	ND	35.54	0.00	1035.53	1035.53
RW-70	10/15/02	ND	39.33	0.00	1032.24	1032.24
RW-75	10/15/02	35.38	37.90	2.52	1035.02	1037.04
RW-80A	10/15/02	17.83	18.54	0.71	1040.18	1040.75
TOR-5	10/15/02	ND	20.81	0.00	1040.94	1040.94
WN-1A	10/15/02	ND	17.17	0.00	1049.78	1049.78
WN-1B	10/15/02	ND	17.22	0.00	1049.33	1049.33
WN-5B	10/15/02	ND	16.57	0.00	1048.25	1048.25
WN-6A	10/15/02	ND	17.83	0.00	1047.89	1047.89
WN-6B	10/15/02	17.17	17.17	Trace	1047.37	1047.37
WN-7B	10/15/02	ND	16.01	0.00	1048.81	1048.81
WN-8B	10/15/02	16.10	16.19	0.09	1048.82	1048.89

- NOTES:
- 1 Measured hydrocarbon thickness = depth to water - depth to LNAPL
 - 2 Corrected water level elevation =
 - Water level elevation + (Oil specific gravity x measured hydrocarbon thickness)
 - * Anomalous water level elevations not used in preparation of water level contour map
 - ** Indicates product-groundwater interface below bottom of well. Product thickness and groundwater elevation indeterminable.
 - *** Indicates that measurement difficulties were encountered. Product thickness and groundwater elevation indeterminable.

LNAPL Light non-aqueous phase liquid
BTOC Below top of casing

AMSL Above mean sea level
ND Petroleum hydrocarbon not detected

Table 2 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
November 2002

Station	Date Measured	Depth to LNAPL (feet BTOC)	Depth to Water (feet BTOC)	Measured Hydrocarbon Thickness (feet) ¹	Water Level Elevation (feet AMSL)	Corrected Water Level Elevation (feet AMSL) ²
10	11/26/02	ND	22.46	0.00	1047.06	1047.06
18	11/26/02	24.5	24.65	0.15	1044.27	1044.39
36	11/26/02	ND	18.95	0.00	1048.59	1048.59
49	11/26/02	ND	18.28	0.00	1046.60	1046.60
70	11/26/02	ND	16.73	0.00	1049.00	1049.00
72	11/26/02	ND	16.72	0.00	1049.47	1049.47
93	11/26/02	ND	17.08	0.00	1048.16	1048.16
98	11/26/02	ND	20.57	0.00	1048.59	1048.59
99	11/26/02	19.78	20.28	0.50	1048.99	1049.41
100	11/26/02	ND	14.79	0.00	1049.00	1049.00
102	11/26/02	21.93	23.04	1.11	1042.44	1043.33
104	11/26/02	17.99	19.85	1.86	1041.76	1043.25
106	11/26/02	ND	26.84	0.00	1047.23	1047.23
109	11/26/02	25.87	25.87	Trace	1045.22	1045.22
110	11/26/02	19.05	19.05	Trace	1043.77	1043.77
113	11/26/02	ND	33.96	0.00	1038.29	1038.29
115	11/26/02	ND	21.06	0.00	1049.55	1049.55
116	11/26/02	ND	22.16	0.00	1049.61	1049.61
117	11/26/02	20.35	20.36	0.01	1049.47	1049.48
118	11/26/02	ND	31.78	0.00	1038.91	1038.91
CMW-1	11/26/02	ND	20.90	0.00	1038.81	1038.81
CMW-2	11/26/02	ND	23.19	0.00	1038.55	1038.55
CMW-3	11/26/02	ND	20.96	0.00	1039.17	1039.17
CMW-4	11/26/02	ND	17.97	0.00	1040.30	1040.30
MW-1001	11/26/02	19.75	21.14	1.39	1041.24	1042.35
MW-1002	11/26/02	ND	32.06	0.00	1040.06	1040.06
MW-12	11/26/02	32.82	32.82	Trace	1039.15	1039.15
MW-13	11/26/02	ND	19.27	0.00	1043.73	1043.73
MW-6	11/26/02	18.67	18.67	Trace	1043.72	1043.72
NAI-11	11/26/02	ND	5.63	0.00	1063.26	1063.26
NAI-18	11/26/02	ND	23.75	0.00	1043.71	1043.71
NAI-23	11/26/02	22.78	23.76	0.98	1046.96	1047.74
NAI-24	11/26/02	ND	21.98	0.00	1047.45	1047.45
RCRA-4	11/26/02	ND	17.52	0.00	1043.91	1043.91
RCRA-7	11/26/02	ND	25.15	0.00	1038.58	1038.58
RFI2-10C	11/26/02	ND	17.76	0.00	1047.54	1047.54
RFI2-11C	11/26/02	ND	17.29	0.00	1050.22	1050.22
RFI2-12C	11/26/02	ND	17.22	0.00	1050.46	1050.46

Table 2 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
November 2002

Station	Date Measured	Depth to LNAPL (feet BTOC)	Depth to Water (feet BTOC)	Measured Hydrocarbon Thickness (feet) ¹	Water Level Elevation (feet AMSL)	Corrected Water Level Elevation (feet AMSL) ²
RFI2-13C	11/26/02	ND	19.02	0.00	1049.30	1049.30
RFI2-15D	11/26/02	ND	19.65	0.00	1048.20	1048.20
RFI2-16D	11/26/02	22.23	22.24	0.01	1047.39	1047.40
RFI2-1D	11/26/02	23.94	24.92	0.98	1046.78	1047.56
RFI2-2A	11/26/02	ND	27.86	0.00	1043.75	1043.75
RFI2-2D	11/26/02	27.89	28.40	0.51	1043.57	1043.98
RFI2-4C	11/26/02	27.74	27.74	Trace	1042.23	1042.23
RFI2-8C	11/26/02	ND	13.91	0.00	1043.76	1043.76
RFI2-9C	11/26/02	ND	19.89	0.00	1045.24	1045.24
RW-10	11/26/02	16.45	22.11	5.66	1038.23	1042.76
RW-20	11/26/02	22.37	22.62	0.25	1042.74	1042.94
RW-30	11/26/02	20.89	21.32	0.43	1040.53	1040.89
RW-35	11/26/02	28.3	28.56	0.26	1034.55	1034.76
RW-40	11/26/02	38.65	39.70	1.05	1032.81	1033.65
RW-45	11/26/02	37.48	37.64	0.16	1034.87	1035.00
RW-50	11/26/02	41.86	43.09	1.23	1029.31	1030.29
RW-55	11/26/02	ND	36.04	0.00	1036.74	1036.74
RW-60	11/26/02	ND	41.73	0.00	1030.64	1030.64
RW-65	11/26/02	ND	35.90	0.00	1035.17	1035.17
RW-70	11/26/02	ND	41.38	0.00	1030.19	1030.19
RW-75	11/26/02	36.38	39.22	2.84	1033.70	1035.97
RW-80A	11/26/02	18.56	18.96	0.40	1039.76	1040.08
WN-1A	11/26/02	ND	17.79	0.00	1049.16	1049.16
WN-5B	11/26/02	ND	17.06	0.00	1047.76	1047.76
WN-6A	11/26/02	ND	18.22	0.00	1047.50	1047.50
WN-6B	11/26/02	15.55	15.55	Trace	1048.99	1048.99
WN-7B	11/26/02	16.46	16.46	Trace	1048.36	1048.36

NOTES: 1 Measured hydrocarbon thickness = depth to water - depth to LNAPL

2 Corrected water level elevation =

Water level elevation + (Oil specific gravity x measured hydrocarbon thickness)

* Anomalous water level elevations not used in preparation of water level contour map

** Indicates product-groundwater interface below bottom of well. Product thickness and groundwater elevation indeterminable.

*** Indicates that measurement difficulties were encountered. Product thickness and groundwater elevation indeterminable.

LNAPL Light non-aqueous phase liquid

AMSL Above mean sea level

BTOC Below top of casing

ND Petroleum hydrocarbon not detected

Table 3 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
December 2002

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
4	12/17/02	18.75	23.60	4.85	1038.86	1042.89
7	12/17/02	24.05	24.35	0.30	1046.55	1046.79
16	12/17/02	21.26	21.34	0.08	1043.16	1043.22
18	12/17/02	24.45	24.58	0.13	1044.34	1044.44
24	12/17/02	ND	15.09	0.00	1053.62	1053.62
49	12/17/02	ND	18.65	0.00	1046.23	1046.23
55	12/17/02	20.34	20.59	0.25	1044.99	1045.19
70	12/17/02	ND	17.02	0.00	1048.71	1048.71
72	12/17/02	ND	16.98	0.00	1049.21	1049.21
75	12/17/02	14.79	14.79	Trace	1048.98	1048.98
92	12/17/02	13.91	13.91	Trace	1047.37	1047.37
93	12/17/02	ND	17.40	0.00	1047.84	1047.84
94	12/17/02	ND	16.36	0.00	1046.65	1046.65
98	12/17/02	ND	20.80	0.00	1048.36	1048.36
100	12/17/02	ND	15.05	0.00	1048.74	1048.74
106	12/17/02	ND	27.23	0.00	1046.84	1046.84
108	12/17/02	ND	25.72	0.00	1046.85	1046.85*
113	12/17/02	ND	34.40	0.00	1037.85	1037.85
115	12/17/02	ND	21.05	0.00	1049.56	1049.56
116	12/17/02	ND	22.30	0.00	1049.47	1049.47
117	12/17/02	20.50	20.52	0.02	1049.31	1049.33
118	12/17/02	ND	31.78	0.00	1038.91	1038.91
CMW-1	12/17/02	ND	21.24	0.00	1038.47	1038.47
CMW-2	12/17/02	ND	23.44	0.00	1038.30	1038.30
CMW-3	12/17/02	ND	21.01	0.00	1039.12	1039.12
CMW-4	12/17/02	ND	18.07	0.00	1040.20	1040.20
ET-03	12/17/02	ND	24.93	0.00	1045.22	1045.22*
MW-1002	12/17/02	ND	32.18	0.00	1039.94	1039.94
MW-12	12/17/02	ND	33.02	0.00	1038.95	1038.95
MW-13	12/17/02	ND	19.67	0.00	1043.33	1043.33
MW-17	12/17/02	ND	18.69	0.00	1047.02	1047.02
MW-6	12/17/02	19.05	19.06	0.01	1043.33	1043.34
RCRA-4	12/17/02	ND	17.70	0.00	1043.73	1043.73
RCRA-7	12/17/02	ND	25.61	0.00	1038.12	1038.12
RFI2-15D	12/17/02	ND	19.84	0.00	1048.01	1048.01
RFI2-16D	12/17/02	22.49	22.49	Trace	1047.14	1047.14
RFI2-17D	12/17/02	25.33	25.36	0.03	1043.81	1043.83
RFI2-1A	12/17/02	28.17	28.17	Trace	1044.34	1044.34

Table 3 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
December 2002

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
RFI2-1D	12/17/02	24.11	25.19	1.08	1046.51	1047.37
RFI2-2A	12/17/02	ND	28.05	0.00	1043.56	1043.56
RW-35	12/17/02	29.62	29.97	0.35	1033.14	1033.42
RW-40	12/17/02	39.06	41.43	2.37	1031.08	1032.98
RW-45	12/17/02	37.80	37.99	0.19	1034.52	1034.67
RW-50	12/17/02	42.75	43.25	0.50	1029.15	1029.55
RW-55	12/17/02	ND	35.79	0.00	1036.99	1036.99
RW-60	12/17/02	ND	42.21	0.00	1030.16	1030.16
RW-65	12/17/02	ND	39.46	0.00	1031.61	1031.61
RW-70	12/17/02	ND	40.77	0.00	1030.80	1030.80
RW-75	12/17/02	39.65	40.54	0.89	1032.38	1033.09
RW-80A	12/17/02	18.73	19.02	0.29	1039.70	1039.93
WN-1B	12/17/02	18.07	18.11	0.04	1048.44	1048.47
WN-5B	12/17/02	ND	17.37	0.00	1047.45	1047.45
WN-6A	12/17/02	ND	18.55	0.00	1047.17	1047.17
WN-6B	12/17/02	ND	17.89	0.00	1046.65	1046.65
WN-7B	12/17/02	ND	16.80	0.00	1048.02	1048.02
WN-8B	12/17/02	18.11	18.12	0.01	1046.89	1046.90

- NOTES:
- 1 Measured hydrocarbon thickness = depth to water - depth to LNAPL
 - 2 Corrected water level elevation =
 - Water level elevation + (Oil specific gravity x measured hydrocarbon thickness)
 - * Anomalous water level elevations not used in preparation of water level contour map
 - ** Indicates product-groundwater interface below bottom of well. Product thickness and groundwater elevation indeterminable.
 - *** Indicates that measurement difficulties were encountered. Product thickness and groundwater elevation indeterminable.
- | | |
|---|--|
| LNAPL Light non-aqueous phase liquid | AMSL Above mean sea level |
| BTOC Below top of casing | ND Petroleum hydrocarbon not detected |

Table 4 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
January 2003

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
3	1/27/03	22.97	23.10	0.13	1041.00	1041.11
4	1/27/03	19.05	23.56	4.51	1038.90	1042.64
10	1/27/03	ND	23.01	0.00	1046.51	1046.51
11	1/27/03	19.64	21.42	1.78	1040.55	1042.05
16	1/27/03	21.40	21.85	0.45	1042.65	1042.99
17	1/27/03	19.50	20.32	0.82	1044.33	1044.95
18	1/27/03	24.89	24.97	0.08	1043.95	1044.01
21	1/27/03	21.30	21.95	0.65	1041.85	1042.33
24	1/27/03	ND	16.40	0.00	1052.31	1052.31
34	1/27/03	17.44	18.90	1.46	1041.79	1043.06
36	1/27/03	ND	19.56	0.00	1047.98	1047.98
42	1/27/03	22.06	22.33	0.27	1042.09	1042.30
44	1/27/03	20.00	20.04	0.04	1044.13	1044.16
45	1/27/03	23.14	23.59	0.45	1042.13	1042.48
48	1/27/03	ND	18.99	0.00	1043.66	1043.66
51	1/27/03	16.89	17.04	0.15	1045.22	1045.33
54	1/27/03	16.00	16.73	0.73	1045.66	1046.21
55	1/27/03	20.62	21.04	0.42	1044.54	1044.88
56	1/27/03	19.51	20.95	1.44	1041.68	1042.83
61	1/27/03	22.97	24.66	1.69	1038.42	1039.81
62	1/27/03	22.46	23.40	0.94	1040.96	1041.75
63	1/27/03	18.35	20.65	2.30	1041.21	1043.17
70	1/27/03	17.34	17.34	Trace	1048.39	1048.39
72	1/27/03	17.24	17.24	Trace	1048.95	1048.95
75	1/27/03	ND	15.15	0.00	1048.62	1048.62
88	1/27/03	20.56	20.84	0.28	1042.06	1042.28
91	1/27/03	19.05	22.22	3.17	1039.11	1041.87
92	1/27/03	ND	14.27	0.00	1047.01	1047.01
93	1/27/03	17.76	17.76	Trace	1047.48	1047.48
94	1/27/03	ND	16.72	0.00	1046.29	1046.29
95	1/27/03	17.30	17.35	0.05	1046.90	1046.94
98	1/27/03	ND	21.19	0.00	1047.97	1047.97
100	1/27/03	15.44	15.44	Trace	1048.35	1048.35
101	1/27/03	22.74	24.39	1.65	1042.09	1043.41
102	1/27/03	22.52	24.30	1.78	1041.18	1042.60
104	1/27/03	18.60	20.70	2.10	1040.91	1042.59
106	1/27/03	ND	27.57	0.00	1046.50	1046.50
108	1/27/03	ND	25.33	0.00	1047.24	1047.24

Table 4 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
January 2003

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
109	1/27/03	26.52	26.86	0.34	1044.23	1044.50
110	1/27/03	ND	19.72	0.00	1043.10	1043.10
113	1/27/03	ND	34.39	0.00	1037.86	1037.86
114	1/27/03	ND	31.71	0.00	1039.05	1039.05
116	1/27/03	ND	22.71	0.00	1049.06	1049.06
117	1/27/03	20.91	20.91	Trace	1048.92	1048.92
118	1/27/03	ND	32.18	0.00	1038.51	1038.51
CMW-1	1/27/03	ND	21.31	0.00	1038.40	1038.40
CMW-2	1/27/03	ND	23.58	0.00	1038.16	1038.16
CMW-3	1/27/03	ND	21.42	0.00	1038.71	1038.71
CMW-4	1/27/03	ND	18.52	0.00	1039.75	1039.75
E-1	1/27/03	21.23	21.72	0.49	1040.06	1040.45
E-3	1/27/03	21.31	21.32	0.01	1041.88	1041.89
ET-03	1/27/03	ND	24.93	0.00	1045.22	1045.22
MW-1001	1/27/03	20.35	21.80	1.45	1040.58	1041.74
MW-1002	1/27/03	ND	32.57	0.00	1039.55	1039.55
MW-1003	1/27/03	32.58	33.82	1.24	1039.75	1040.74
MW-12	1/27/03	ND	33.33	0.00	1038.64	1038.64
MW-13	1/27/03	19.92	19.92	Trace	1043.08	1043.08
MW-17	1/27/03	18.97	19.58	0.61	1046.13	1046.62
MW-3	1/27/03	32.86	33.34	0.48	1039.29	1039.67
MW-6	1/27/03	19.31	19.34	0.03	1043.05	1043.07
NAI-13	1/27/03	ND	24.60	0.00	1043.86	1043.86
NAI-18	1/27/03	ND	21.10	0.00	1046.36	1046.36
RCRA-4	1/27/03	ND	18.09	0.00	1043.34	1043.34
RCRA-7	1/27/03	ND	25.63	0.00	1038.10	1038.10
RCRA-8(R)	1/27/03	ND	21.77	0.00	1042.60	1042.60
RCRA-MW-4	1/27/03	29.32	29.36	0.04	1040.73	1040.76
RFI2-11C	1/27/03	ND	17.57	0.00	1049.94	1049.94
RFI2-14C	1/27/03	ND	22.55	0.00	1049.14	1049.14
RFI2-16D	1/27/03	ND	23.90	0.00	1045.73	1045.73
RFI2-1A	1/27/03	28.46	28.46	Trace	1044.05	1044.05
RFI2-1D	1/27/03	24.50	24.82	0.32	1046.88	1047.14
RFI2-2A	1/27/03	ND	28.34	0.00	1043.27	1043.27
RFI2-2D	1/27/03	28.52	28.52	Trace	1043.45	1043.45
RFI2-7C	1/27/03	ND	18.96	0.00	1042.37	1042.37
RFI2-8C	1/27/03	ND	14.43	0.00	1043.24	1043.24
RFI2-9C	1/27/03	ND	20.57	0.00	1044.56	1044.56

Table 4 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
January 2003

Station	Date Measured	Depth to LNAPL (feet BTOC)	Depth to Water (feet BTOC)	Measured Hydrocarbon Thickness (feet)¹	Water Level Elevation (feet AMSL)	Corrected Water Level Elevation (feet AMSL)²
RW-10	1/27/03	17.23	22.29	5.06	1038.05	1042.10
RW-20	1/27/03	22.84	24.55	1.71	1040.81	1042.18
RW-30	1/27/03	20.87	23.70	2.83	1038.15	1040.53
RW-35	1/27/03	30.11	30.46	0.35	1032.65	1032.93
RW-40	1/27/03	38.62	40.33	1.71	1032.18	1033.55
RW-45	1/27/03	38.00	38.49	0.49	1034.02	1034.41
RW-50	1/27/03	43.90	44.44	0.54	1027.96	1028.39
RW-55	1/27/03	ND	36.29	0.00	1036.49	1036.49
RW-60	1/27/03	ND	42.13	0.00	1030.24	1030.24
RW-65	1/27/03	ND	35.48	0.00	1035.59	1035.59
RW-70	1/27/03	ND	40.26	0.00	1031.31	1031.31
RW-75	1/27/03	43.55	44.68	1.13	1028.24	1029.14
RW-80A	1/27/03	19.25	20.19	0.94	1038.53	1039.28
TOR-5	1/27/03	ND	21.75	0.00	1040.00	1040.00
WN-1A	1/27/03	ND	18.83	0.00	1048.12	1048.12
WN-1B	1/27/03	ND	18.40	0.00	1048.15	1048.15
WN-5B	1/27/03	ND	17.71	0.00	1047.11	1047.11
WN-6A	1/27/03	ND	19.35	0.00	1046.37	1046.37
WN-6B	1/27/03	18.24	18.24	Trace	1046.30	1046.30
WN-7B	1/27/03	17.05	17.05	Trace	1047.77	1047.77
WN-8B	1/27/03	17.54	17.55	0.01	1047.46	1047.47

- NOTES:
- 1 Measured hydrocarbon thickness = depth to water - depth to LNAPL
 - 2 Corrected water level elevation =

Water level elevation + (Oil specific gravity x measured hydrocarbon thickness)

 - * Anomalous water level elevations not used in preparation of water level contour map
 - ** Indicates product-groundwater interface below bottom of well. Product thickness and groundwater elevation indeterminable.
 - *** Indicates that measurement difficulties were encountered. Product thickness and groundwater elevation indeterminable.

LNAPL Light non-aqueous phase liquid

AMSL Above mean sea level

BTOC Below top of casing

ND Petroleum hydrocarbon not detected

Table 5 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
February 2003

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
4	2/20/03	19.44	23.59	4.15	1038.87	1042.31
7	2/20/03	24.45	24.95	0.50	1045.95	1046.36
10	2/20/03	ND	23.09	0.00	1046.43	1046.43
11	2/20/03	19.78	21.96	2.18	1040.01	1041.84
16	2/20/03	21.63	22.17	0.54	1042.33	1042.74
17	2/20/03	19.64	20.53	0.89	1044.12	1044.80
18	2/20/03	24.93	25.08	0.15	1043.84	1043.96
21	2/20/03	21.50	22.22	0.72	1041.58	1042.11
24	2/20/03	ND	16.86	0.00	1051.85	1051.85
34	2/20/03	17.62	19.11	1.49	1041.58	1042.88
36	2/20/03	ND	19.62	0.00	1047.92	1047.92
42	2/20/03	22.13	22.51	0.38	1041.91	1042.20
44	2/20/03	ND	20.16	0.00	1044.01	1044.01
45	2/20/03	23.38	24.05	0.67	1041.67	1042.19
47	2/20/03	22.11	24.55	2.44	1039.96	1041.94
49	2/20/03	ND	19.18	0.00	1045.70	1045.70
51	2/20/03	17.07	17.29	0.22	1044.97	1045.14
54	2/20/03	16.12	16.92	0.80	1045.47	1046.08
55	2/20/03	20.79	21.33	0.54	1044.25	1044.68
56	2/20/03	19.52	20.05	0.53	1042.58	1043.00
58	2/20/03	18.82	20.71	1.89	1038.85	1040.42
59	2/20/03	20.40	22.53	2.13	1036.45	1038.20
61	2/20/03	23.18	24.99	1.81	1038.09	1039.57
62	2/20/03	22.60	23.73	1.13	1040.63	1041.58
63	2/20/03	18.51	21.13	2.62	1040.73	1042.96
70	2/20/03	17.46	17.47	0.01	1048.26	1048.27
72	2/20/03	17.38	17.38	Trace	1048.81	1048.81
75	2/20/03	ND	15.30	0.00	1048.47	1048.47
91	2/20/03	19.20	20.48	1.28	1040.85	1041.96
92	2/20/03	ND	14.41	0.00	1046.87	1046.87
93	2/20/03	18.91	18.91	Trace	1046.33	1046.33
94	2/20/03	16.89	16.89	Trace	1046.12	1046.12
95	2/20/03	17.42	17.51	0.09	1046.74	1046.81
96	2/20/03	23.31	24.17	0.86	1042.30	1043.05
97	2/20/03	21.78	23.90	2.12	1045.31	1047.05
98	2/20/03	ND	21.30	0.00	1047.86	1047.86
100	2/20/03	15.58	15.58	Trace	1048.21	1048.21
101	2/20/03	22.93	24.67	1.74	1041.81	1043.20
102	2/20/03	22.70	24.47	1.77	1041.01	1042.43

Table 5 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
February 2003

Station	Date Measured	Depth to LNAPL (feet BTOC)	Depth to Water (feet BTOC)	Measured Hydrocarbon Thickness (feet) ¹	Water Level Elevation (feet AMSL)	Corrected Water Level Elevation (feet AMSL) ²
103	2/20/03	22.26	23.31	1.05	1042.75	1043.59
104	2/20/03	18.79	20.74	1.95	1040.87	1042.43
106	2/20/03	ND	27.52	0.00	1046.55	1046.55
108	2/20/03	ND	25.08	0.00	1047.49	1047.49*
109	2/20/03	26.54	26.80	0.26	1044.29	1044.50
110	2/20/03	19.59	19.59	Trace	1043.23	1043.23
113	2/20/03	ND	34.73	0.00	1037.52	1037.52
114	2/20/03	ND	31.66	0.00	1039.10	1039.10
116	2/20/03	22.86	22.86	Trace	1048.91	1048.91
117	2/20/03	21.04	21.08	0.04	1048.75	1048.78
118	2/20/03	ND	32.10	0.00	1038.59	1038.59
CMW-1	2/20/03	ND	21.54	0.00	1038.17	1038.17
CMW-2	2/20/03	ND	23.78	0.00	1037.96	1037.96
CMW-3	2/20/03	ND	21.34	0.00	1038.79	1038.79
CMW-4	2/20/03	ND	18.30	0.00	1039.97	1039.97
E-1	2/20/03	21.36	21.89	0.53	1039.89	1040.31
E-3	2/20/03	21.39	21.46	0.07	1041.74	1041.80
ET-03	2/20/03	ND	24.93	0.00	1045.22	1045.22
MW-1001	2/20/03	20.02	21.40	1.38	1040.98	1042.08
MW-1002	2/20/03	ND	32.40	0.00	1039.72	1039.72
MW-1003	2/20/03	32.34	33.19	0.85	1040.38	1041.06
MW-12	2/20/03	ND	33.49	0.00	1038.48	1038.48
MW-13	2/20/03	ND	20.06	0.00	1042.94	1042.94
MW-17	2/20/03	19.09	19.69	0.60	1046.02	1046.50
MW-3	2/20/03	33.06	33.60	0.54	1039.03	1039.46
MW-6	2/20/03	19.43	19.47	0.04	1042.92	1042.95
NAI-11	2/20/03	ND	4.43	0.00	1064.46	1064.46
NAI-13	2/20/03	ND	24.50	0.00	1043.96	1043.96
NAI-18	2/20/03	ND	21.60	0.00	1045.86	1045.86
NAI-24	2/20/03	22.85	22.89	0.04	1046.54	1046.57
RCRA-4	2/20/03	ND	17.54	0.00	1043.89	1043.89
RCRA-7	2/20/03	ND	25.96	0.00	1037.77	1037.77
RCRA-8(R)	2/20/03	ND	21.56	0.00	1042.81	1042.81
RCRA-MW-4	2/20/03	29.41	29.54	0.13	1040.55	1040.65
RFI2-11C	2/20/03	ND	17.66	0.00	1049.85	1049.85
RFI2-12C	2/20/03	ND	17.69	0.00	1049.99	1049.99
RFI2-13C	2/20/03	ND	19.74	0.00	1048.58	1048.58
RFI2-14C	2/20/03	ND	22.70	0.00	1048.99	1048.99
RFI2-15D	2/20/03	20.26	20.31	0.05	1047.54	1047.58

Table 5 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
February 2003

Station	Date Measured	Depth to LNAPL (feet BTOC)	Depth to Water (feet BTOC)	Measured Hydrocarbon Thickness (feet) ¹	Water Level Elevation (feet AMSL)	Corrected Water Level Elevation (feet AMSL) ²
RFI2-16D	2/20/03	22.87	23.85	0.98	1045.78	1046.56
RFI2-1A	2/20/03	ND	28.11	0.00	1044.40	1044.40
RFI2-1D	2/20/03	24.62	25.64	1.02	1046.06	1046.88
RFI2-2A	2/20/03	ND	27.98	0.00	1043.63	1043.63
RFI2-2D	2/20/03	ND	28.39	0.00	1043.58	1043.58
RFI2-7C	2/20/03	ND	18.55	0.00	1042.78	1042.78
RFI2-8C	2/20/03	ND	13.83	0.00	1043.84	1043.84
RFI2-9C	2/20/03	ND	20.36	0.00	1044.77	1044.77
RW-10	2/20/03	17.33	22.50	5.17	1037.84	1041.98
RW-20	2/20/03	23.98	25.22	1.24	1040.14	1041.13
RW-30	2/20/03	21.47	21.93	0.46	1039.92	1040.31
RW-35	2/20/03	30.66	30.96	0.30	1032.15	1032.39
RW-40	2/20/03	39.67	40.39	0.72	1032.12	1032.70
RW-45	2/20/03	38.29	38.85	0.56	1033.66	1034.11
RW-50	2/20/03	44.57	45.99	1.42	1026.41	1027.55
RW-55	2/20/03	ND	36.92	0.00	1035.86	1035.86
RW-60	2/20/03	ND	43.00	0.00	1029.37	1029.37
RW-65	2/20/03	ND	35.80	0.00	1035.27	1035.27
RW-70	2/20/03	ND	43.60	0.00	1027.97	1027.97
RW-75	2/20/03	41.68	42.40	0.72	1030.52	1031.10
RW-80A	2/20/03	18.70	20.30	1.60	1038.42	1039.70
TOR-5	2/20/03	ND	22.03	0.00	1039.72	1039.72
WN-1A	2/20/03	ND	18.93	0.00	1048.02	1048.02
WN-1B	2/20/03	ND	18.51	0.00	1048.04	1048.04
WN-5B	2/20/03	18.80	18.82	0.02	1046.00	1046.02
WN-6A	2/20/03	ND	19.45	0.00	1046.27	1046.27
WN-6B	2/20/03	19.36	19.36	Trace	1045.18	1045.18
WN-7B	2/20/03	17.24	17.25	0.01	1047.57	1047.58
WN-8B	2/20/03	17.70	17.71	0.01	1047.30	1047.31

NOTES: 1 Measured hydrocarbon thickness = depth to water - depth to LNAPL

2 Corrected water level elevation =

Water level elevation + (Oil specific gravity x measured hydrocarbon thickness)

* Anomalous water level elevations not used in preparation of water level contour map

** Indicates product-groundwater interface below bottom of well. Product thickness and groundwater elevation indeterminable.

*** Indicates that measurement difficulties were encountered. Product thickness and groundwater elevation indeterminable.

LNAPL Light non-aqueous phase liquid
BTOC Below top of casing

AMSL Above mean sea level
ND Petroleum hydrocarbon not detected

Table 6 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
March 2003

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
4	3/11/03	19.36	23.58	4.22	1038.88	1042.38
7	3/11/03	24.40	24.83	0.43	1046.07	1046.42
10	3/11/03	ND	23.02	0.00	1046.50	1046.50
11	3/11/03	19.84	21.23	1.39	1040.74	1041.91
16	3/11/03	21.54	21.92	0.38	1042.58	1042.87
17	3/11/03	19.55	20.28	0.73	1044.37	1044.92
18	3/11/03	24.70	24.86	0.16	1044.06	1044.19
21	3/11/03	21.42	21.92	0.50	1041.88	1042.25
24	3/11/03	ND	16.69	0.00	1052.02	1052.02
34	3/11/03	17.54	18.91	1.37	1041.78	1042.97
36	3/11/03	ND	19.51	0.00	1048.03	1048.03
42	3/11/03	22.03	22.42	0.39	1042.00	1042.30
44	3/11/03	20.00	20.08	0.08	1044.09	1044.15
45	3/11/03	23.25	23.82	0.57	1041.90	1042.34
47	3/11/03	22.02	24.46	2.44	1040.05	1042.03
49	3/11/03	ND	19.06	0.00	1045.82	1045.82
51	3/11/03	16.96	17.15	0.19	1045.11	1045.25
54	3/11/03	16.03	16.57	0.54	1045.82	1046.23
55	3/11/03	20.71	20.84	0.13	1044.74	1044.84
56	3/11/03	19.43	19.90	0.47	1042.73	1043.11
58	3/11/03	18.89	20.73	1.84	1038.83	1040.36
59	3/11/03	20.36	22.39	2.03	1036.59	1038.25
61	3/11/03	23.13	24.55	1.42	1038.53	1039.69
62	3/11/03	22.61	23.72	1.11	1040.64	1041.57
63	3/11/03	18.50	21.23	2.73	1040.63	1042.95
70	3/11/03	ND	17.38	0.00	1048.35	1048.35
72	3/11/03	ND	17.30	0.00	1048.89	1048.89
75	3/11/03	ND	15.21	0.00	1048.56	1048.56
77	3/11/03	ND	19.14	0.00	1044.15	1044.15
91	3/11/03	19.19	19.90	0.71	1041.43	1042.05
92	3/11/03	14.32	14.39	0.07	1046.89	1046.95
93	3/11/03	17.82	17.85	0.03	1047.39	1047.41
94	3/11/03	ND	16.79	0.00	1046.22	1046.22
95	3/11/03	17.37	17.39	0.02	1046.86	1046.88
96	3/11/03	23.22	24.01	0.79	1042.46	1043.15
97	3/11/03	21.72	23.80	2.08	1045.41	1047.12
98	3/11/03	ND	21.25	0.00	1047.91	1047.91
100	3/11/03	ND	15.49	0.00	1048.30	1048.30

Table 6 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
March 2003

Station	Date Measured	Depth to LNAPL (feet BTOC)	Depth to Water (feet BTOC)	Measured Hydrocarbon Thickness (feet) ¹	Water Level Elevation (feet AMSL)	Corrected Water Level Elevation (feet AMSL) ²
101	3/11/03	22.86	24.35	1.49	1042.13	1043.32
102	3/11/03	22.62	24.25	1.63	1041.23	1042.53
103	3/11/03	22.16	23.12	0.96	1042.94	1043.71
104	3/11/03	18.70	20.62	1.92	1040.99	1042.53
106	3/11/03	ND	27.43	0.00	1046.64	1046.64
108	3/11/03	ND	24.39	0.00	1048.18	1048.18*
109	3/11/03	26.45	26.55	0.10	1044.54	1044.62
110	3/11/03	ND	19.53	0.00	1043.29	1043.29
113	3/11/03	ND	34.60	0.00	1037.65	1037.65
114	3/11/03	ND	31.61	0.00	1039.15	1039.15
116	3/11/03	ND	22.80	0.00	1048.97	1048.97
117	3/11/03	20.99	21.02	0.03	1048.81	1048.84
118	3/11/03	ND	32.07	0.00	1038.62	1038.62
CMW-1	3/11/03	ND	21.47	0.00	1038.24	1038.24
CMW-2	3/11/03	ND	23.70	0.00	1038.04	1038.04
CMW-3	3/11/03	ND	21.30	0.00	1038.83	1038.83
CMW-4	3/11/03	ND	18.30	0.00	1039.97	1039.97
E-1	3/11/03	21.39	21.90	0.51	1039.88	1040.29
E-3	3/11/03	20.36	20.37	0.01	1042.83	1042.84
MW-1001	3/11/03	20.00	21.39	1.39	1040.99	1042.10
MW-1002	3/11/03	ND	32.41	0.00	1039.71	1039.71
MW-1003	3/11/03	32.32	33.15	0.83	1040.42	1041.08
MW-12	3/11/03	ND	33.36	0.00	1038.61	1038.61
MW-13	3/11/03	ND	19.93	0.00	1043.07	1043.07
MW-17	3/11/03	ND	19.07	0.00	1046.64	1046.64
MW-3	3/11/03	33.01	33.26	0.25	1039.37	1039.57
MW-6	3/11/03	19.32	19.33	0.01	1043.06	1043.07
RCRA-4	3/11/03	ND	17.64	0.00	1043.79	1043.79
RCRA-7	3/11/03	ND	25.85	0.00	1037.88	1037.88
RCRA-8(R)	3/11/03	ND	21.55	0.00	1042.82	1042.82
RCRA-MW-4	3/11/03	29.29	29.41	0.12	1040.68	1040.78
RFI2-10C	3/11/03	ND	18.32	0.00	1046.98	1046.98
RFI2-11C	3/11/03	ND	17.65	0.00	1049.86	1049.86
RFI2-12C	3/11/03	ND	17.64	0.00	1050.04	1050.04
RFI2-13C	3/11/03	ND	19.70	0.00	1048.62	1048.62
RFI2-14C	3/11/03	ND	22.65	0.00	1049.04	1049.04
RFI2-15D	3/11/03	20.26	20.29	0.03	1047.56	1047.58
RFI2-16D	3/11/03	22.81	23.97	1.16	1045.66	1046.59

Table 6 ICM Groundwater Levels and Measured Hydrocarbon Thickness
TPI Petroleum, Inc. Arkansas City Refinery
March 2003

<i>Station</i>	<i>Date Measured</i>	<i>Depth to LNAPL (feet BTOC)</i>	<i>Depth to Water (feet BTOC)</i>	<i>Measured Hydrocarbon Thickness (feet)¹</i>	<i>Water Level Elevation (feet AMSL)</i>	<i>Corrected Water Level Elevation (feet AMSL)²</i>
RFI2-1A	3/11/03	ND	28.20	0.00	1044.31	1044.31
RFI2-1D	3/11/03	24.57	25.50	0.93	1046.20	1046.94
RFI2-2A	3/11/03	ND	28.01	0.00	1043.60	1043.60
RFI2-2D	3/11/03	28.24	28.53	0.29	1043.44	1043.67
RFI2-7C	3/11/03	ND	18.56	0.00	1042.77	1042.77
RFI2-8C	3/11/03	ND	13.90	0.00	1043.77	1043.77
RFI2-9C	3/11/03	ND	20.25	0.00	1044.88	1044.88
RW-10	3/11/03	17.24	22.17	4.93	1038.17	1042.11
RW-20	3/11/03	22.89	25.16	2.27	1040.20	1042.02
RW-30	3/11/03	21.45	21.92	0.47	1039.93	1040.32
RW-35	3/11/03	30.62	31.02	0.40	1032.09	1032.41
RW-40	3/11/03	39.70	40.34	0.64	1032.17	1032.68
RW-45	3/11/03	38.23	38.66	0.43	1033.85	1034.19
RW-50	3/11/03	ND	44.74	0.00	1027.66	1027.66
RW-55	3/11/03	ND	36.26	0.00	1036.52	1036.52
RW-60	3/11/03	ND	41.56	0.00	1030.81	1030.81
RW-65	3/11/03	ND	35.90	0.00	1035.17	1035.17
RW-70	3/11/03	ND	43.07	0.00	1028.50	1028.50
RW-75	3/11/03	42.08	42.94	0.86	1029.98	1030.67
RW-80A	3/11/03	18.70	20.15	1.45	1038.57	1039.73
TOR-5	3/11/03	ND	21.89	0.00	1039.86	1039.86
WN-1A	3/11/03	ND	18.82	0.00	1048.13	1048.13
WN-1B	3/11/03	ND	18.40	0.00	1048.15	1048.15
WN-5B	3/11/03	ND	17.66	0.00	1047.16	1047.16
WN-6A	3/11/03	ND	19.32	0.00	1046.40	1046.40
WN-6B	3/11/03	ND	18.20	0.00	1046.34	1046.34
WN-7B	3/11/03	ND	17.14	0.00	1047.68	1047.68
WN-8B	3/11/03	ND	17.70	0.00	1047.31	1047.31

- NOTES:
- 1 Measured hydrocarbon thickness = depth to water - depth to LNAPL
 - 2 Corrected water level elevation =
 - Water level elevation + (Oil specific gravity x measured hydrocarbon thickness)
 - * Anomalous water level elevations not used in preparation of water level contour map
 - ** Indicates product-groundwater interface below bottom of well. Product thickness and groundwater elevation indeterminable.
 - *** Indicates that measurement difficulties were encountered. Product thickness and groundwater elevation indeterminable.

LNAPL Light non-aqueous phase liquid
BTOC Below top of casing

AMSL Above mean sea level
ND Petroleum hydrocarbon not detected

Table 7 Summary of Groundwater Pumping Rates
TPI Petroleum, Inc. Arkansas City Refinery

	Oct. 2002	Nov. 2002	Dec. 2002	January 2003	February 2003	March 2003
Average groundwater pumping rate (g.p.m.)	1,180	1,180	1,230	1,200	1,200	1,200
Product Recovery (gallons)	2,930	3,330	3,610	3,770	2,520	2,070

Notes:

g.p.m. = gallons per minute

Groundwater flow rates are combined rates monitored at bioreactor tank R7101.

Product recovery is gauged at Tank 7132. Product line accumulators were also used to gauge product recovery at individual wells during the reporting period.

TABLE 8 October 2002 Walnut River Visual Inspection Log
TPI Petroleum, Inc. Arkansas City Refinery

Area	Date Inspected	River Bank Inspection	Visual Inspection Performed by
Zone 1	10/04/02	No Seep	H. Green
Zone 2	10/04/02	No Seep	H. Green
Zone 3	10/04/02	No Seep	H. Green
Zone 4	10/04/02	No Seep	H. Green
Zone 5	10/04/02	No Seep	H. Green

TABLE 9 November 2002 Walnut River Visual Inspection Log
TPI Petroleum, Inc. Arkansas City Refinery

Area	Date Inspected	River Bank Inspection	Visual Inspection Performed by
Zone 1	11/01/02	No Seep	R. Rahn
Zone 2	11/01/02	No Seep	R. Rahn
Zone 3	11/01/02	No Seep	R. Rahn
Zone 4	11/01/02	No Seep	R. Rahn
Zone 5	11/01/02	No Seep	R. Rahn

TABLE 10 December 2002 Walnut River Visual Inspection Log
TPI Petroleum, Inc. Arkansas City Refinery

Area	Date Inspected	River Bank Inspection	Visual Inspection Performed by
Zone 1	12/06/02	No Seep	H. Green, R. Rahn
Zone 2	12/06/02	No Seep	H. Green, R. Rahn
Zone 3	12/06/02	No Seep	H. Green, R. Rahn
Zone 4	12/06/02	No Seep	H. Green, R. Rahn
Zone 5	12/06/02	No Seep	H. Green, R. Rahn

TABLE 11 January 2003 Walnut River Visual Inspection Log
TPI Petroleum, Inc. Arkansas City Refinery

Area	Date Inspected	River Bank Inspection	Visual Inspection Performed by
Zone 1	01/02/03	No Seep	R. Rahn
Zone 2	01/02/03	No Seep	R. Rahn
Zone 3	01/02/03	No Seep	R. Rahn
Zone 4	01/02/03	No Seep	R. Rahn
Zone 5	01/02/03	No Seep	R. Rahn

TABLE 12 February 2003 Walnut River Visual Inspection Log
TPI Petroleum, Inc. Arkansas City Refinery

Area	Date Inspected	River Bank Inspection	Visual Inspection Performed by
Zone 1	02/07/03	No Seep	H. Green
Zone 2	02/07/03	No Seep	H. Green
Zone 3	02/07/03	No Seep	H. Green
Zone 4	02/07/03	No Seep	H. Green
Zone 5	02/07/03	No Seep	H. Green

TABLE 13 March 2003 Walnut River Visual Inspection Log
TPI Petroleum, Inc. Arkansas City Refinery

Area	Date Inspected	River Bank Inspection	Visual Inspection Performed by
Zone 1	03/14/03	No Seep	H. Green, R. Rahn
Zone 2	03/14/03	No Seep	H. Green, R. Rahn
Zone 3	03/14/03	No Seep	H. Green, R. Rahn
Zone 4	03/14/03	No Seep	H. Green, R. Rahn
Zone 5	03/14/03	No Seep	H. Green, R. Rahn

EXPLANATION

- 1.23 PRODUCT THICKNESS MONITORING WELL (PRODUCT THICKNESS IN FEET - NO VALUE INDICATES PRODUCT WAS NOT DETECTED)
- NA PRODUCT PRESENT BUT THICKNESS WAS INDETERMINABLE
- ▲ ICM RECOVERY WELL
- △ SHALLOW ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING)
- ▽ DEEP ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING)
- ▼ MONITORING WELL SCREENED BELOW THE WATER TABLE
- TEMPORARY PIEZOMETER
- MONITORING WELL
- 1.23 1050.48 PRODUCT THICKNESS (PRODUCT THICKNESS IN FEET)
- 1047 GROUNDWATER ELEVATION CORRECTED FOR PRODUCT THICKNESS, FEET ABOVE MEAN SEA LEVEL
- 1045 DIRECTION OF SURFACE WATER FLOW
- 1044 CORRECTED WATER LEVEL ELEVATION CONTOUR DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL, 1 FOOT CONTOUR INTERVAL WITH THE EXCEPTION OF THE MOUND IN THE NORTH AREA)
- 1043 CORRECTED WATER LEVEL ELEVATION CONTOUR DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL, 5 FOOT CONTOUR INTERVAL)
- 1042 DIRECTION OF GROUNDWATER FLOW
- 1041 ABOVE GROUND PRODUCT STORAGE TANK
- 1040 REFINERY PROPERTY BOUNDARY
- 1039 LINE SURROUNDS ALL LOCATIONS WHERE MEASURABLE THICKNESS OF PHASE-SEPARATED HYDROCARBONS WAS OBSERVED - DASHED WHERE INFERRED.

N

FEET
0 200 400 600 800

 EnecoTech[®]
ENVIRONMENTAL CONSULTANTS

Figure No.: 1

GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR MAP AND EXTENT OF PHASE-SEPARATED HYDROCARBONS (OCTOBER 15, 2002)

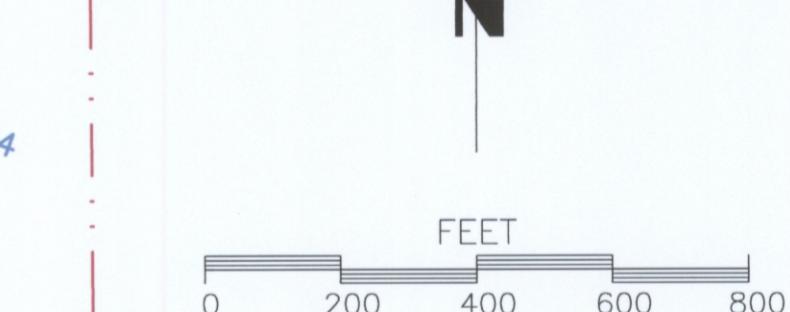
PROJECT: TPI PETROLEUM, INC. - ARKANSAS CITY REFINERY

RECOVERY WELL PUMPING RATES	
WELL ID	RATE(GPM)
RW-10	-
RW-20	-
RW-30	5
RW-35	250
RW-40	130
RW-45	110
RW-50	50
RW-55	20
RW-60	175
RW-65	165
RW-70	160
RW-75	15
RW-80A	50

99-0138R-018	DESIGNED BY:	APPROVED BY: JFM
ICM_10-02	DRAWN BY:	DATE: REV:

EXPLANATION

- 1.23 PRODUCT THICKNESS MONITORING WELL (PRODUCT THICKNESS IN FEET – NO VALUE INDICATES PRODUCT WAS NOT DETECTED)
- NA PRODUCT PRESENT BUT THICKNESS WAS INDETERMINABLE
- △ ICM RECOVERY WELL
- ▽ SHALLOW ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING)
- ▼ DEEP ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING)
- ▼ MONITORING WELL SCREENED BELOW THE WATER TABLE
- TEMPORARY PIEZOMETER
- MONITORING WELL
- 1.23 PRODUCT THICKNESS (PRODUCT THICKNESS IN FEET)
- 1050.48 GROUNDWATER ELEVATION CORRECTED FOR PRODUCT THICKNESS, FEET ABOVE MEAN SEA LEVEL
- DIRECTION OF SURFACE WATER FLOW
- 1047 — CORRECTED WATER LEVEL ELEVATION CONTOUR
DASHED WHERE INFERRED
(FEET ABOVE MEAN SEA LEVEL, 1 FOOT CONTOUR INTERVAL WITH THE EXCEPTION OF THE MOUND IN THE NORTH AREA)
- 1045 — CORRECTED WATER LEVEL ELEVATION CONTOUR
DASHED WHERE INFERRED
(FEET ABOVE MEAN SEA LEVEL, 5 FOOT CONTOUR INTERVAL)
- DIRECTION OF GROUNDWATER FLOW
- ABOVE GROUND PRODUCT STORAGE TANK
- REFINERY PROPERTY BOUNDARY
- LINE SURROUNDS ALL LOCATIONS WHERE MEASURABLE THICKNESS OF PHASE-SEPARATED HYDROCARBONS WAS OBSERVED – DASHED WHERE INFERRED.



EnecoTech®
ENVIRONMENTAL CONSULTANTS

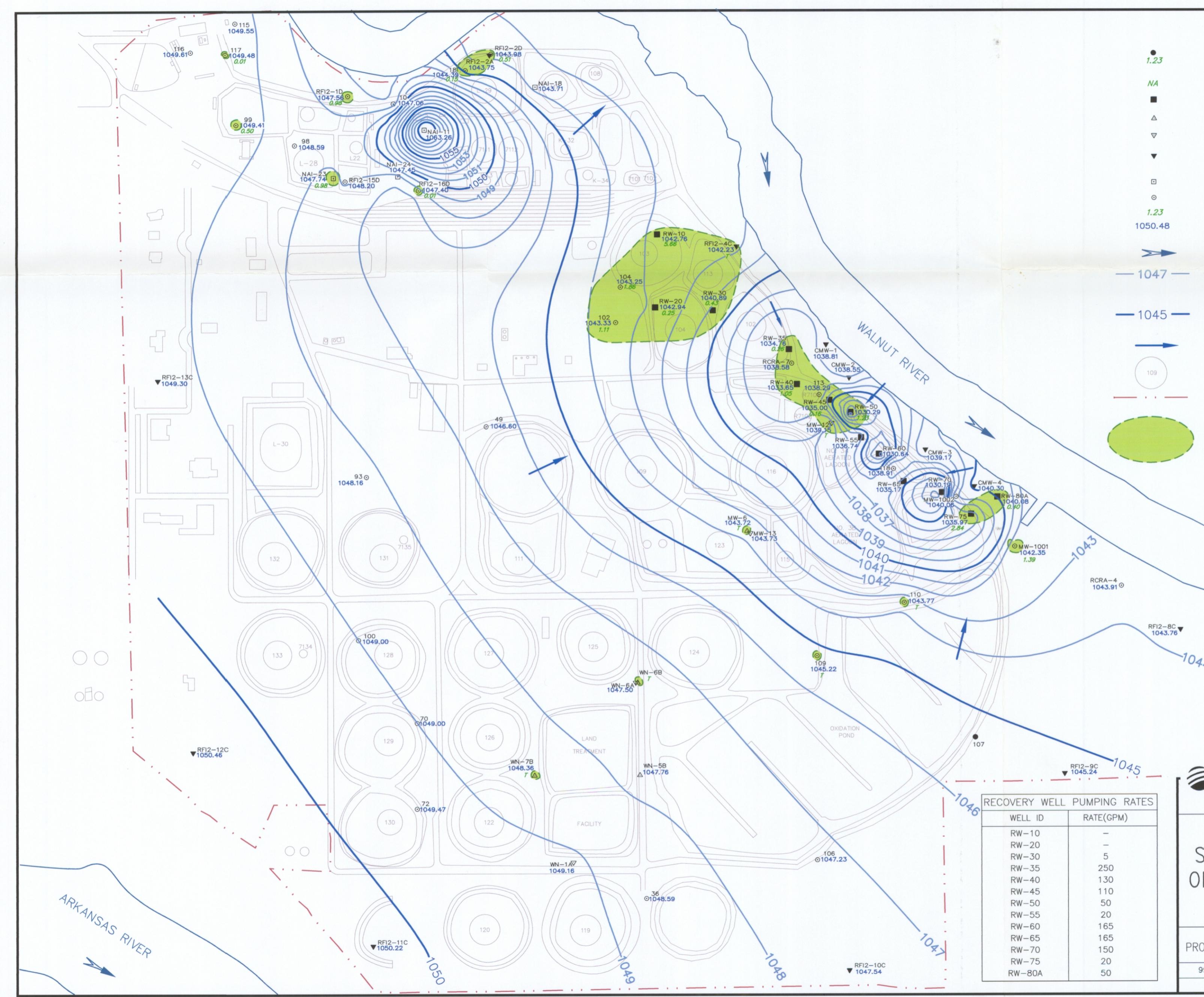
Figure No.: 2

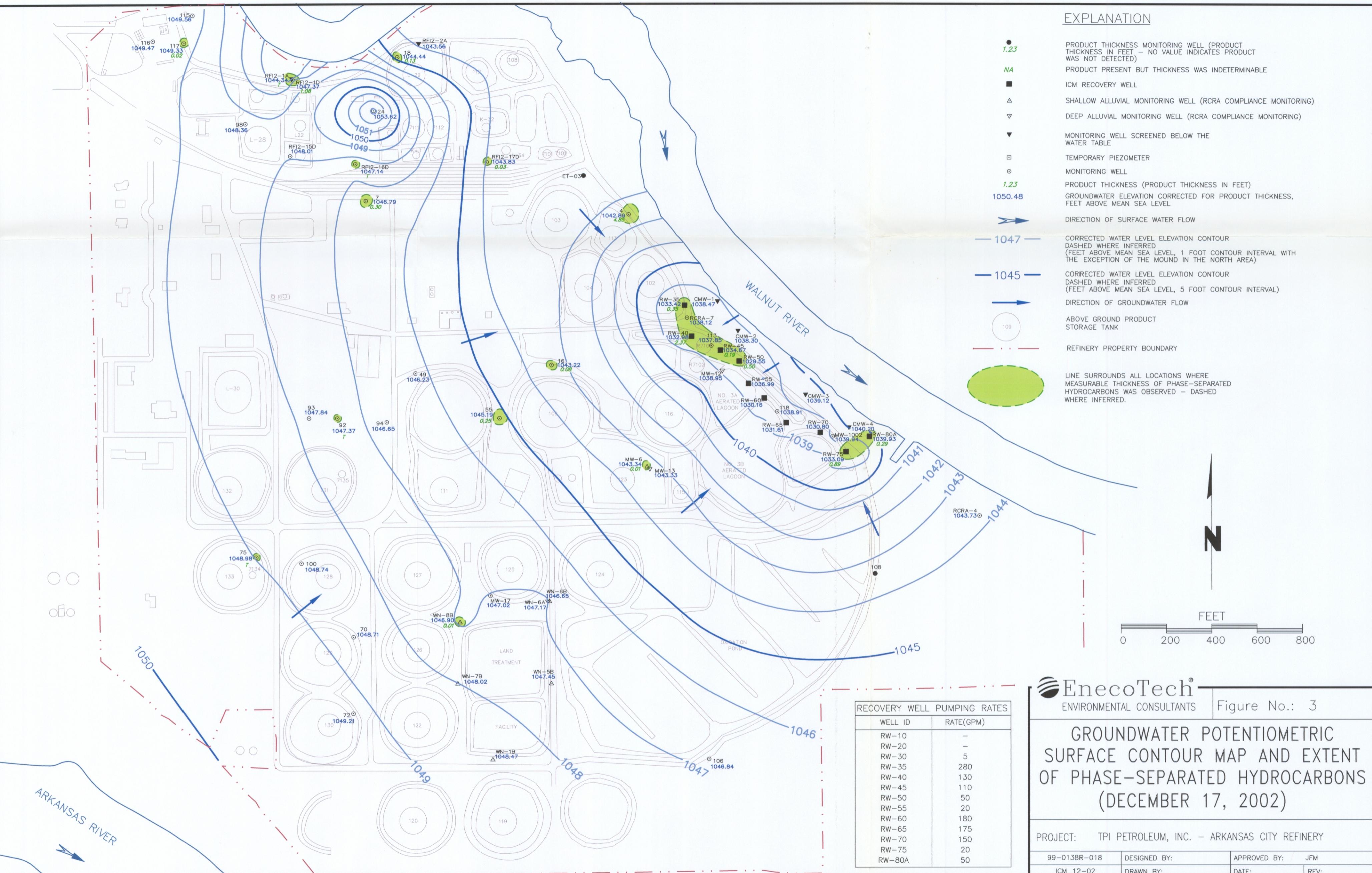
GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR MAP AND EXTENT OF PHASE-SEPARATED HYDROCARBONS (NOVEMBER 26, 2002)

PROJECT: TPI PETROLEUM, INC. – ARKANSAS CITY REFINERY

99-0138R-018	DESIGNED BY:	APPROVED BY: JFM
ICM_11-02	DRAWN BY:	DATE: REV:

RECOVERY WELL PUMPING RATES	
WELL ID	RATE(GPM)
RW-10	–
RW-20	–
RW-30	5
RW-35	250
RW-40	130
RW-45	110
RW-50	50
RW-55	20
RW-60	165
RW-65	165
RW-70	150
RW-75	20
RW-80A	50





EXPLANATION

- 1.23 PRODUCT THICKNESS MONITORING WELL (PRODUCT THICKNESS IN FEET – NO VALUE INDICATES PRODUCT WAS NOT DETECTED)
- NA ■ PRODUCT PRESENT BUT THICKNESS WAS INDETERMINABLE
- ICM RECOVERY WELL ▲
- SHALLOW ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING) ▽
- DEEP ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING) ▼
- MONITORING WELL SCREENED BELOW THE WATER TABLE □
- TEMPORARY PIEZOMETER ○
- MONITORING WELL 1.23
- PRODUCT THICKNESS (PRODUCT THICKNESS IN FEET)
- GROUNDWATER ELEVATION CORRECTED FOR PRODUCT THICKNESS, FEET ABOVE MEAN SEA LEVEL
- DIRECTION OF SURFACE WATER FLOW →
- CORRECTED WATER LEVEL ELEVATION CONTOUR DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL, 1 FOOT CONTOUR INTERVAL WITH THE EXCEPTION OF THE MOUND IN THE NORTH AREA)
- CORRECTED WATER LEVEL ELEVATION CONTOUR DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL, 5 FOOT CONTOUR INTERVAL)
- DIRECTION OF GROUNDWATER FLOW →
- ABOVE GROUND PRODUCT STORAGE TANK 109
- REFINERY PROPERTY BOUNDARY

LINE SURROUNDS ALL LOCATIONS WHERE MEASURABLE THICKNESS OF PHASE-SEPARATED HYDROCARBONS WAS OBSERVED – DASHED WHERE INFERRED.



FEET
0 200 400 600 800

EnecoTech®
ENVIRONMENTAL CONSULTANTS | Figure No.: 4

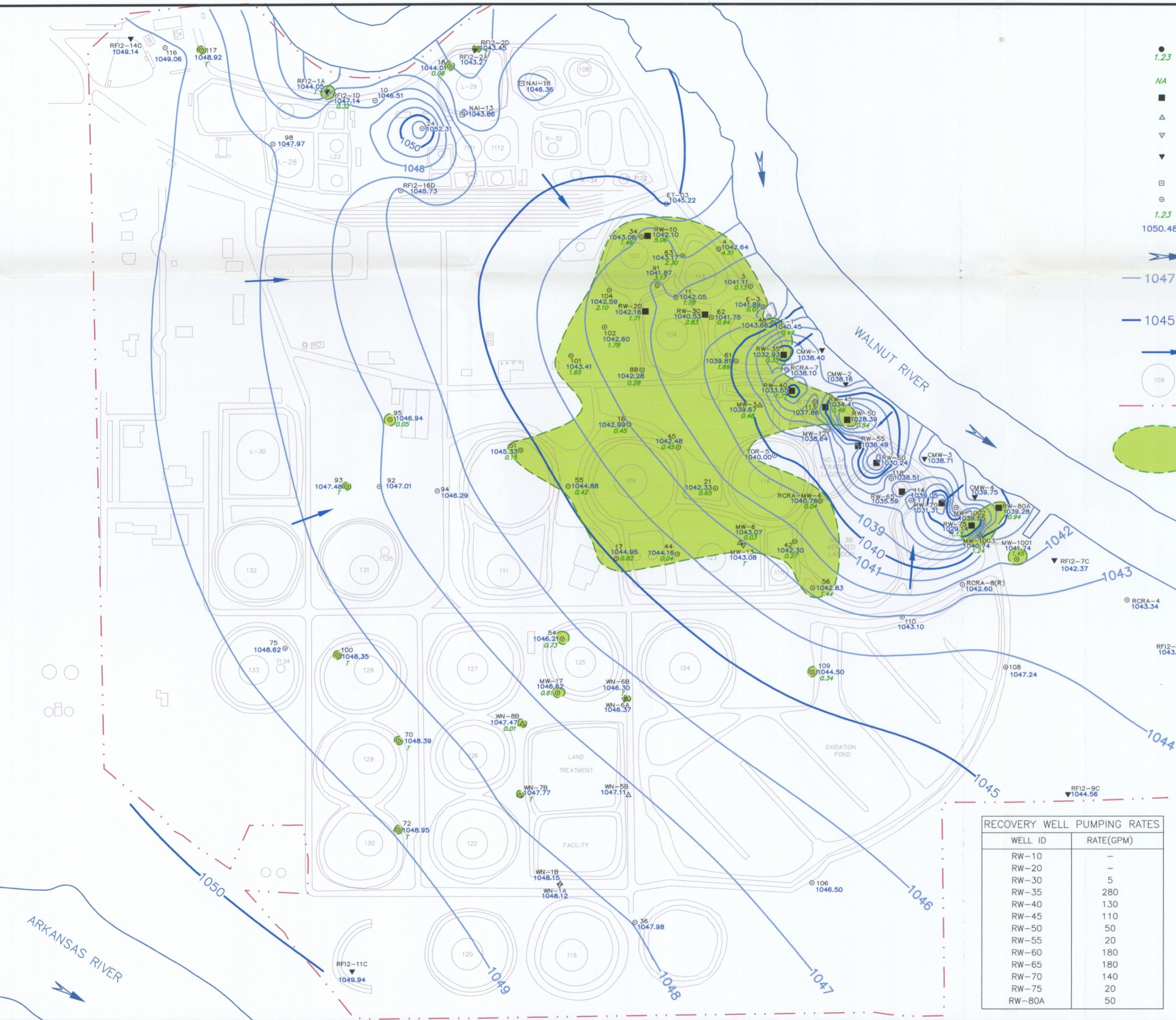
GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR MAP AND EXTENT OF PHASE-SEPARATED HYDROCARBONS (JANUARY 27, 2003)

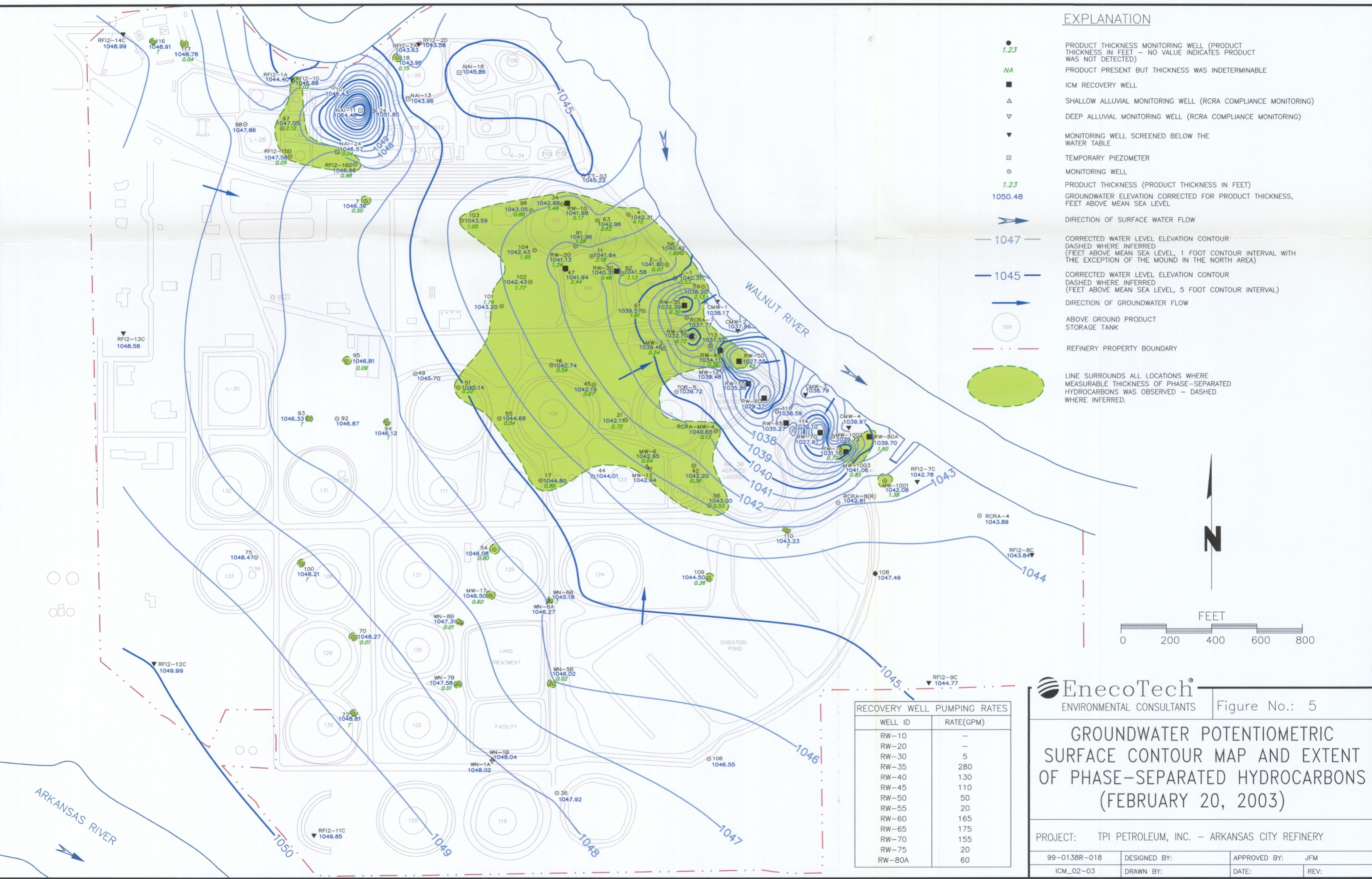
PROJECT: TPI PETROLEUM, INC. – ARKANSAS CITY REFINERY

RECOVERY WELL PUMPING RATES	
WELL ID	RATE(GPM)
RW-10	–
RW-20	–
RW-30	5
RW-35	280
RW-40	130
RW-45	110
RW-50	50
RW-55	20
RW-60	180
RW-65	180
RW-70	140
RW-75	20
RW-80A	50

99-0138R-018 | DESIGNED BY: | APPROVED BY: JFM

ICM_01-03 | DRAWN BY: | DATE: | REV:





EXPLANATION

- 1.23 PRODUCT THICKNESS MONITORING WELL (PRODUCT THICKNESS IN FEET – NO VALUE INDICATES PRODUCT WAS NOT DETECTED)
- NA PRODUCT PRESENT BUT THICKNESS WAS INDETERMINABLE
- ICM RECOVERY WELL
- △ SHALLOW ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING)
- ▽ DEEP ALLUVIAL MONITORING WELL (RCRA COMPLIANCE MONITORING)
- ▼ MONITORING WELL SCREENED BELOW THE WATER TABLE
- TEMPORARY PIEZOMETER
- MONITORING WELL
- 1.23 PRODUCT THICKNESS (PRODUCT THICKNESS IN FEET)
- 1050.48 GROUNDWATER ELEVATION CORRECTED FOR PRODUCT THICKNESS, FEET ABOVE MEAN SEA LEVEL
- DIRECTION OF SURFACE WATER FLOW
- 1047 CORRECTED WATER LEVEL ELEVATION CONTOUR DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL, 1 FOOT CONTOUR INTERVAL WITH THE EXCEPTION OF THE MOUND IN THE NORTH AREA)
- 1045 CORRECTED WATER LEVEL ELEVATION CONTOUR DASHED WHERE INFERRED (FEET ABOVE MEAN SEA LEVEL, 5 FOOT CONTOUR INTERVAL)
- DIRECTION OF GROUNDWATER FLOW
- ABOVE GROUND PRODUCT STORAGE TANK
- REFINERY PROPERTY BOUNDARY
- LINE SURROUNDS ALL LOCATIONS WHERE MEASURABLE THICKNESS OF PHASE-SEPARATED HYDROCARBONS WAS OBSERVED – DASHED WHERE INFERRED.

LINE SURROUNDS ALL LOCATIONS WHERE MEASURABLE THICKNESS OF PHASE-SEPARATED HYDROCARBONS WAS OBSERVED – DASHED WHERE INFERRED.

N

0 200 400 600 800
FEET

EnecoTech®
ENVIRONMENTAL CONSULTANTS

Figure No.: 6

GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR MAP AND EXTENT OF PHASE-SEPARATED HYDROCARBONS (MARCH 11, 2003)

PROJECT: TPI PETROLEUM, INC. – ARKANSAS CITY REFINERY

99-0138R-018 | DESIGNED BY: | APPROVED BY: JFM

ICM_03-03 | DRAWN BY: | DATE: | REV:

RECOVERY WELL PUMPING RATES	
WELL ID	RATE(GPM)
RW-10	–
RW-20	–
RW-30	5
RW-35	280
RW-40	130
RW-45	110
RW-50	50
RW-55	20
RW-60	130
RW-65	175
RW-70	150
RW-75	20
RW-80A	40